PORTLAND STATE UNIVERSITY

Department of Civil & Environmental Engineering
Engineering Building, Room 200
www.cee.pdx.edu
503-725-4282

Course Number	**CE 458/555 Spring Quarter 2007**
Title	**Public Transportation Systems**
Section	**001**
CRN(s)	60453/60468
Credits	**4**
Design Credits	**1.5**
Prerequisite(s)	**CE 351. CE 454 Recommended.**
Days/Time	**Mondays and Wednesdays 18:00-19:50**
Location	**Engineering Building (EB) 310**
Final Exam Day/Time	**Wednesday June 6, 2007, 18:00-19:50,** EB 310

Course Website	http://www.bertini.org. A substantial amount of material will be made available to you via the course website (including this syllabus). As the quarter progresses, we will post presentations, homework solutions and relevant links.

Instructor	**Paul Ryus, P.E.**	**Dr. Robert L. Bertini, P.E.**
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Office Hours	TBA	TBA
	Instructors are available at other times by appointment. You're encouraged to call, email and stop by the office if you need assistance of any kind in this class, other classes, developing your resume, finding internships, jobs, etc.	
Mailbox Location	CEE Office, EB Suite 200	CEE Office, EB Suite 200

Required Text:

1. *Transit Capacity and Quality of Service Manual*, Transit Cooperative Research Program, TRB, Washington D.C., 2003. *The Second Edition is available for free download at:* http://www4.trb.org/trb/onlinepubs.nsf/web/tcrp_report_100
2. *Course Reader*, to be purchased from Department of Civil & Environmental Engineering ($15)
3. Summary of TCRP Report 88: http://gulliver.trb.org/publications/tcrp/tcrp_rrd_56.pdf
4. APTA Public Transportation Fact Book 2004: http://www.apta.com/research/stats/

Other Reading:

1. George E. Gray, Lester A. Hoel, Editors, *Public Transportation*, Second Edition. Prentice-Hall, 1992.
2. Vuchic, Vukan R., *Urban Public Transportation: Systems and Technology*, Prentice-Hall, 1981.

Other readings to be distributed in class.

Catalog Course Description: *Performance characteristics of public transportation systems, with emphasis on urban systems. Planning, design, and operational issues related to public transportation systems. Emerging technologies.*

Course Objectives – Students must demonstrate the ability to:

- Understand the breadth and depth of public transportation systems with a systems design perspective, with familiarity of terminology and standards.
- Understand the unique features that distinguish public transportation design.
- Comprehend the opportunities and challenges associated with the intermodal and multimodal nature of present and future transportation systems.
- Critically evaluate public transportation system claims, proposals and projects.
- Be prepared to be integral players in public transportation planning, design and construction teams.
- Perform individual research, with proper citation of academic sources and communicate results to colleagues and instructor.

Course Requirements:

- Lecture materials and announcements.
- Assigned readings should be done prior to the relevant class.
- Assignments to be done on one side of letter-sized paper, using professional presentation standards with a staple in the upper left corner.
- Public transportation research project (oral presentation and written report).
- Attendance mandatory for the project presentations.
- Midterm and comprehensive final exams.
- All written responses in this course shall be in your own words.

Course Grading

Students will be evaluated on the following course components:

AssignmentPoints	**Due**	**Assigned or % of Total Grade**
Homework		15%
Paper Proposal	April 11, 2007	5%
Midterm	May 2, 2007	20%
Research Paper	June 11, 2007	30%
Presentation Attendance	June 11, 2007	5%
Final	June 6, 2007	25%

A curve will be used to determine the final course letter grade.
Students with disabilities should discuss any arrangements that will enhance their learning in this class with the instructor.

Professionalism

All assignments and class participation should be conducted in a professional manner. Attention to detail on class assignments and communication is important and is part of the learning experience in this course.

Incompletes

A grade of "I" is granted by the instructor *only* with prior approval and consent. Criteria are outlined in the PSU Bulletin.

Program requirements

The CEE Department requires that junior and senior engineering courses must be completed with a minimum grade of C-, and a student's cumulative PSU GPA must be 2.25 or higher to graduate from the BSCE program.

Tentative Schedule (Subject to Modification)

NO.	DATE	TOPIC		
1	4/2	**Introduction (RB)** ▪ Definitions, Vocabulary and Statistics ▪ *Term Paper Discussion - Topics, Resources*	4/4	**Technology Overview (RB)** ▪ Historical Development ▪ Vehicle Characteristics & Dynamics ▪ Right-of-Way and Modal Classifications ▪ System Characteristics and Agency Relationships
2	4/9	**Quality of Service Concepts (PR)** ▪ Role of Transit ▪ Performance Points of View ▪ Transit Availability ▪ Transit Comfort and Convenience	4/11	***Term Paper Proposal Due*** **Public Transportation System Planning (RB)** ▪ Planning Process Overview ▪ Information Needs and Demand Forecasting ▪ Screening Alternatives **Public Transportation Administration** ▪ Structure of Typical Transit Organization ▪ Transit Finance in Oregon **Public Transit Design Issues** ▪ Multidisciplinary Approach and Des. Team Dynamics ▪ Project Management/Consultant-Client Relationships
3	4/16	**Measuring Quality of Service (PR)** ▪ Transit Capacity & Quality of Service Manual ▪ Levels of Service ▪ Customer Satisfaction Surveys ▪ Passenger Environment Surveys ▪ Reporting Methods	4/18	**Transit Service (RB)** ▪ Regulatory Environment ▪ Vehicle and System Performance ▪ Service Planning/Routing/Fares/Revenue
4	4/23	**Capacity Concepts (PR)** ▪ Vehicle Types ▪ Dwell Time ▪ Fare Collection ▪ Bus Stop Designs ▪ Peak Hour Factor ▪ Design Capacity vs. Maximum Capacity	4/25	*Guest Speaker:* **Jennifer Dill – TOD** **Transit Operations Principles (RB)** ▪ Methods of Analysis ▪ Dwell Time Analysis ▪ Trip Time Analysis
5	4/30	**Bus Facility Capacity (PR)** ▪ Loading Areas ▪ Bus Stops ▪ Transit Centers ▪ Busways and HOV Lanes	5/2	***Midterm*** **(RB)**

		▪ Exclusive Bus Lanes ▪ Mixed Traffic *Review for Midterm*		
6	5/7	**Speed Concepts (PR)** **Ridership & QOS** ▪ Elasticity ▪ Traveler Responses to QOS Changes	5/9	**Transit Operations and Maintenance (RB)** ▪ Scheduling and Operations ▪ Labor and Management Issues ▪ Maintenance Considerations
7	5/14	**Stop, Station and Terminal Capacity (PR)** ▪ Station Types ▪ Sizing Station Elements ▪ Accessibility (ADA) ▪ Emergency Egress	5/16	**Bus Facility Design (RB)** ▪ Accessibility (ADA) ▪ Guideways ▪ Terminals, Intermodal & Maintenance Facilities
8	5/21	**Bus Rapid Transit Service Planning (PR)** ▪ BRT Elements ▪ Applications ▪ Case Study: K Street, Washington, DC ▪ Case Study: Edmonton, Alberta North Corridor	5/23	**Rail Systems Design (RB)** ▪ Traction Electrification/Power ▪ Signaling & Communications ▪ Fare Collection, Safety and Security
9	5/28	**HOLIDAY** University Closed	5/30	*Guest Speaker – TriMet* **Paratransit (RB)** ▪ Requirements ▪ Service and System Characteristics **Advanced Public Transportation Systems** ▪ Technology ▪ Benefits and Costs ▪ Case Study: Transit Signal Priority
10	6/4	**Rail Transit Capacity (PR)** ▪ Types of Rights-of-Way ▪ Headway Constraints ▪ Junctions and Turnbacks ▪ Heavy Rail ▪ Light Rail ▪ Case Study: MAX ▪ Commuter Rail **Transit Performance Measurement (PR)**	6/6	***FINAL EXAM (Last Class Meeting)*** **(PR)**
	6/11	***TERM PAPER DUE AND STUDENT PRESENTATIONS*** *(Final Exam Period)* **19:30-21:20**		

Possible Guest Speakers (To Be Announced)
Steve Callas, TriMet, Using Bus Dispatch for Improving Scheduling and Service Modeling
Dr. Kate Hunter-Zaworski, OSU, Accessible Transit Systems/Americans With Disabilities Act
Graham Carey, Lane Transit District, Bus Rapid Transit
Young Park, TriMet, Rail Transit Design
Dave Crout, TriMet, Signal Priority Project

Public Transportation Research Project

A professional paper based on a relevant topic in public transportation systems, which is of interest to the student, is required as an integral part of this course. The topic will be selected in close consultation with the instructors. The student is required to perform individual library and literature based research (Note: research is much more than just typing in a word at Google.com). If this is your first paper and/or presentation for a graduate class, you are particularly encouraged to seek individual guidance from the instructor. The paper will be developed as follows:

- April 2, 2007 Discussion of possible paper topics.
- April 11, 2007 Paper Proposal due.
- June 11, 2007 Paper due.

Paper Topics
Select a topic that is of interest to you, and that is reasonable in scope--not too narrow, and not too broad. In addition, be sure that there is plenty of information relating to your topic in easily obtainable sources. In selecting your topic, you should think beyond presenting simply history, or a literature survey; you should think of what new ideas and innovative solutions you can add to a particular topic. The paper should be written in your own words, with careful attention to proper citation of sources. A discussion of possible topics will be held.

Paper Proposal
Your proposal is due on April 11, 2007 and is limited to two pages (typed/word processed) and shall include the following:

- Your name
- Paper title
- Specific **objectives** in bullet format (where you're going)
- Preliminary outline of paper, in table of contents format (how you're going to get there)
- Evidence of preliminary library and literature research. This should include a list of library references (minimum of ten relevant journal articles or technical reports). NOTE: The references must be submitted using the proper TRB reference format described below (do not simply paste TRIS or MELVYL results).

Introduction to Library and Literature Research

With the advent of the Internet it is very tempting to think that all necessary resources for a term project will be available in full text after typing in a few words at Google.com. This notion should be discarded immediately. We will discuss the concepts of library and literature research, involving your need to access real books and articles contained in referreed/archival journals. You will need to use real library search tools and will also need to go to the library and physically touch some sources of information.

Note that for this course transportation textbooks and web sites do not count as library references. Several good sources for finding transportation journal articles and other documents are:

- National Transportation Library www.bts.gov/NTL

- TRIS Online http://ntl.bts.gov/tris
- Melvyl index www.melvyl.ucop.edu

NOTE: Library references for most relevant documents will be provided as output from your searches using these tools. You will have to actually look up the document in the PSU library or request it through interlibrary loan.

Be sure to make use of the Vikat catalog, go to the PSU library home page at http://vikat.pdx.edu. Also available on the library home page http://www.lib.pdx.edu are Full Text Electronic Journals: http://www.lib.pdx.edu/~bvws/bytitle.html, and a list of on-line Databases: http://www.lib.pdx.edu/resources/databases/databases.html. Try EI Compendex (http://www.ei.org/ev2/ev2.home) and Lexis-Nexis. Note that access to these databases is free for PSU students, but you must be using a computer on campus or via a dial-in service. See http://www.lib.pdx.edu/services/distance/proxyserver.html for instructions on how to gain off-campus access using a proxy server.

Paper Format

Please follow the Transportation Research Board (TRB) procedures for preparing your manuscript: http://www4.nas.edu/trb/annual.nsf/web/information_for_authors. Minimum requirements for the paper are:

- Paper should consist of approximately 15 pages of double-spaced text using 12-point clearly legible type on one side of letter-sized paper.
- All exhibits, tables, figures, charts, appendices, should be labeled, sources cited, and will not count towards the suggested 15-page length.
- One-inch top, bottom, left, and right margins are recommended, number pages in upper right corner.
- Include a title page, abstract, body of paper, acknowledgements and list of specific references cited in the text.
- Do not use any special binding—just staple in the upper left hand corner.
- Avoid jargon, acronyms, and use of personal pronouns in your paper.
- Each student must write an individual paper.

References

- The reference list shall include only those references cited in the text; number them in the reference list in the order they are first cited in the text.
- Denote a reference at the appropriate place in the text by an underlined or italic arabic numeral in parentheses, e.g., (2).
- Do not repeat a reference in the list and do not use ibid., idem, op. cit., or loc. cit. If a reference is cited more than one time in the text, repeat the number first assigned to the reference.
- Do not use footnotes to the text. Incorporate such notes within the text.

Use the TRB style found at:
http://www4.nas.edu/trb/annual.nsf/web/information_for_authors#References
The following are some samples of the basic style for references:

Sample Reference Style for TRB Publications:

V. Zahavi and J.M. Ryan. Stability of Travel Over Time. In *Transportation Research Record 750*, TRB, National Research Council, Washington, D.C., 1980, pp. 70-75.

Sample Reference Style for Book:

D. Shinar. *Psychology on the Road: The Human Factor in Traffic Safety*. John Wiley and Sons, Inc., New York, 1978.

Sample Reference Style for Periodical:

J.K. Jolliffe and T.P. Hutchinson. A Behavioral Explanation of the Association Between Bus and Passenger Arrivals at a Bus Stop (in Japanese). *Transportation Science*, Vol. 9, No. 3, May 1975, pp. 248-282.

Sample Reference Style for Government Report:

B.J. Dempsey. *Climatic Effects of Airport Pavement Systems: State of the Art*. Report DOT2DRD-75-196. FHWA, U.S. Department of Transportation, 1976.

Paper Evaluation
You will be evaluated on your paper as follows:
- Introduction/Background - 10 %
- **Objectives** - 10 %
- Body and Quality of Research Tools Used - 40 %
- Conclusions/Recommendations/Perspective - 20 %
- Language/Style - 10%
- Overall Impression - 10%

Presentation
Attendance
All students are required to attend all paper presentations. You will not be graded on your presentation *per se*. This should be looked upon as an opportunity to gain experience making a professional presentation in a supportive environment, among your peers.

Delivery
The primary contributors to an effective presentation are (a) technical content, (b) visual aids, and (c) skills of the speaker. Remember that a presentation may (should) differ from the printed paper and that the presentation gives the author an opportunity to discuss and emphasize highlights of the work, which may not be possible to do in the printed version. It is recommended that you think towards structuring your presentation as follows:

- Title
- **Objectives**
- Outline of Presentation
- Methodology
- Body
- Summary
- Conclusion
- Perspectives

Do not read the paper or presentation. Practice to become completely familiar with your presentation so that you can speak from memory or notes. Concentrate on your delivery. Speak clearly and at a pace somewhat slower than normal conversation. Avoid a monotone. Can you be heard throughout the room, and are you facing your audience, instead of looking at the visual aids?

Timing
Your presentation will be limited in time (to be determined). Most people are surprised when their time is up! It is very helpful if you practice your talk beforehand, keeping track of elapsed time. Recognize that actual presentations usually take longer than rehearsals. Help your audience by not exceeding your allotted speaking time.

Visual Aids
Visual aids are always effective tools for communicating your ideas quickly, and therefore are recommended. An overhead projector will be available. Do not consider using the white/chalk board as a substitute for visual aids. Please do not use all text visuals that convey no additional information to the audience. A maximum of one or two visuals should be used per minute of presentation. The instructor will be happy to assist you in the development of visual aids.

Possible Paper Topics

In addition to the required library research, it may be helpful to initially explore some web sites, especially:

- FTA http://www.fta.dot.gov/
- APTA http://www.apta.com/
- TriMet http://www.trimet.org
- Lane Transit District http://www.ltd.org/index.html
- Transit Capacity Manual http://webboard.trb.org/~tcqsm
- BRT http://brt.volpe.dot.gov/index.html
- Interactive Scheduling Man. http://www.trimet.org/temp/trimetscheduling/trimet.html

See if you can do some preliminary scanning and find a subject that interests and maybe even excites you. I have listed several possible topic ideas for your consideration:

- TriMet: study details of "dwell" using data collection device.
- Other uses for GPS data collection devices—study trip chaining, etc.
- Study OHSU/PSU transit ridership issues (Route 8/9)
- Design transit oriented development at University Place
- Design concepts for Milwaukie LRT extension
- Study deceleration/acceleration at bus stops.
- Tri-Met Bus data analysis: for example, use bus GPS data to validate signal timing improvement.
- Tri-Met Bus data analysis: analyze potential impacts of coordinating Hawthorne bridge opening times with buses.
- TriMet bus data analysis: assess relocation of nearside/farside stop at Hawthorne/39th
- Trimet bus data analysis: investigate major route intersection points, assess value of timed transfer, etc.
- Trimet: measure benefits of "bridge priority"
- Oregon Transit Finance: read paper by Brian Taylor analyzing California transit finance and perform parallel study using Oregon data.
- Chicago Transit Authority Research Project
- Lane Transit District specific project
- Tri-Met specific project
- Portland Streetcar – survey or demand analysis or simulation
- HSR
- Paratransit/ADA/Accessibility
- Transit and Airport Access: Case Studies and Effectiveness
- Public Transportation and Land Use
- How land uses change over time (GIS)
- Required land use for transit success
- Use Portland RLIS/GIS
- Air Quality Improvements from Transit
- Strategies to Increase Use of Public Transportation
- Public Transportation as an Equitable Form of Transportation
- Welfare to Work
- Rural Public Transportation
- Demand Analysis for Public Transportation
- Exclusive Public Transportation Facilities (Busways, Reversible, Contraflow)
- Energy Efficiency and Public Transportation
- Traffic Signal Preemption for Bus and Rail
- Grade Crossing Safety
- Public Transportation in the Portland Regional Transportation Plan (2000) or the the 2040 Growth Concept
- LRT Safety Analysis
- APTS
- LRT
- BRT

- Develop a proposal for converting a TriMet frequent service line into a BRT line—what would it look like, what BRT features would it have, what would be the travel time savings compared to current service, estimate its operating costs and number of buses required, etc.
- GIS: Repeat mid-1990s Nelson\Nygaard work for TriMet that developed a relationship between transit ridership in traffic analysis zones and the population and employment of those zones, using current data.
- GIS: Compare light rail station activity by time of day to the types and intensities of adjacent land uses. What characteristics appear to contribute to all-day station activity?
- Explore the history of Portland transit, from cable cars to aerial trams. What modes have been used, why were those modes used, what have been the service characteristics, where did service go, who provided the service, how much did it cost, etc.

Chicago Transit Authority Project Ideas

Area A: Systematic Variation in Ridership

1. Effects of Temperature and Precipitation on Ridership

Research at New York City Transit's Revenue Analysis Unit revealed that there is a strong relationship between weather variables and passenger arrival rates. Using a regression model, they estimated the association between various combinations of weather variables including either actual or forecasted temperature and precipitation. The purpose of their model was to calculate monthly revenue adjusted for weather variations, to compare to revenue projections. This project would aim to replicate the project using CTA's automatic fare collection data. More generally, this research proposal would be aimed at understanding more about how passengers use the system. CTA also has the capability to estimate average trip length on the rail system by time period, and possibly this is related to weather as well. What is the model form with the most explanatory power? How can one explain the model results in intuitive terms of how passengers behave? Data required (in MS Access):

- Chicago temperature and precipitation data (by time periods or by hour) in electronic format
- Half-hourly boardings, for bus system (by route), and for rail system (by entry station)
- Half-hourly average trip length for rail system (by entry station)
- (Other time-periods could be used in lieu of half-hourly data: daily totals, for instance may be sufficient).

2. Day of Week, Part of Month and Year Effect on Ridership

Day of week, part of month, and month of year probably affects ridership levels in a systematic way. This would have implications in sampling, and its findings will hopefully be consistent with CTA's seasonal scheduling practice. Currently, CTA conducts sample point volume checks, running time checks and surveys. Data required:

- Daily boardings on bus system and on rail system (separately) for at least one year (in MS Access)

3. Early and Late Rail Commuters and Trip Chaining by City Neighborhood

Social class is thought to have a significant impact on when passengers need to get to work and when they come home. Using serial-encoded farecard data from the automatic fare collection (AFC) system, CTA can assign a destination station to rail system entries. CTA's origin-destination algorithm contains the assumption that wherever the card is used next on the rail system is the station when the passenger last exited the rail system. System entries are time-stamped to the second at the turnstile. Using a sample of this enhanced AFC data, it would be possible to calculate the average workday (using their time of arrival at their alighting station in the AM and time of arrival at their boarding station in the PM) by entry station. This would help CTA understand the characteristics of its travel market. Additional data for extending this topic could include use of the pass type, which differentiates seniors, reduced fares, university students (UPASS) and other school students. Data required (in Access):

- Time-stamped entries with farecard ID, pass type, destination, estimated arrival time (one-day sample)

4. ('Transit Lifetime') Shift of Users' Preferred Transit Mode Using Farecard Data

Some passengers use the same farecard for an extended period of time. Three-thousand smartcards allow examination of patterns over even longer periods. Recent slight decreases in month over month bus ridership on certain bus routes have caused concern among CTA planners. Are these due to passengers switching from bus to rail? Data required:

Distribution of duration of card use (for affected bus routes)

- AFC data in some preprocessed form to be determined as needed by students

Area B. Service Planning

5. Passenger Flow Effects of Loop Service Reconfiguration

CTA periodically reconfigures its routing schemes to keep up with changes in demand and/or to keep within capacity constraints. The impact of changing routing schemes at the loop has been studied only in terms of the reduction of train conflicts at the two flat junctions in the loop. Recent research at CTA has allowed some initial analysis of how passengers use the loop in terms of route choice and direction of boarding. New data produced by this research uses the farecard OD model (described in 3) to assign destinations to system entries. Because four out of the nine loop stations have independent fare collection for their inner and outer loop platforms, direction of travel around the loop is known for entries at those four stations. The Green Line does not terminate in the loop and thus does not serve the full loop but only one side of it. By examining the entry location of outbound trips headed to the Green Line from the loop stations, it is possible to draw conclusions on how many people walk rather than transfer to reach their work location. Given this level of examination of how passengers use the loop, it should be possible to better understand how many passengers would be affected by various routing changes. Data on loop station use is more reliable for the PM peak, as passenger's exits in the loop as determined through the farecard OD estimation method are simply based on the next use. Thus, if a passenger uses a different path in the AM and PM, the AM data would be unobservable. Data required (in MS Access):

- Origin and destination data for linked system entries
- Existing SQL queries for loop passenger flows

C. Train Location Data

6. Service Control Monitoring

CTA's SCADA (supervisory control and data acquisition) system began logging track circuit occupancy data on the rail system earlier this year. Track circuit occupancy is when a track circuit (a section of track, usually between 200 and 1500 feet long) becomes occupied or unoccupied by a train. Although only a minority of track circuits systemwide send indications into a database through SCADA, the selection of available track circuits is sufficient to monitor many aspects of operations. The uses of analysis of this data include modification of vehicle schedules as well as monitoring of service control. Service control at CTA consists mainly of tower operation and terminal operation. At towers, a local 'Tower Operator' makes decisions about priority through flat junctions (thus affecting downstream headway reliability). CTA is interested in using real-time data as one way to study how its tower operators work and what rules they use to prioritize trains. As the SCADA system does monitor the occupancy of terminal station tracks, the data can also be used to study how train sequence is modified on a day-to-day basis. The practice of spreading intervals at the terminal, although well known in the field, has not been monitored through real-time data. Data required (in MS Access or Excel)

- Sample track circuit data for selected track circuits (as dependent on the location being studied). [Note: Some track circuits give false occupancy data (false positives), although there is generally enough information available to automatically clean the data. If necessary, the data can be cleaned at CTA before being sent.]

Computer and Email Accounts

All engineering students should activate their engineering computer account (go to the CadLab in SB2, 169) which will allow them to use engineering computer labs and email. You should activate it *before* the day you need it. If you encounter problems with this account, see the lab attendant, or email: support@cecs.pdx.edu. Please note: the CEE Department regularly sends course announcements, job information, etc. to students' CECS accounts, so if you do not check it regularly, we recommend forwarding your CECS e-mail to whatever e-mail address you use.

Ethics and Professionalism

Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.

The PSU Student Conduct Code prohibits all forms of academic cheating, fraud, and dishonesty. Further details can be found in the PSU Bulletin. Allegations of academic dishonesty may be addressed by the instructor, and/or may be referred to the Office of Student Affairs for action. Acts of academic dishonesty may result a failing grade on the exam or assignment for which the dishonesty occurred, disciplinary probation, suspension or dismissal from the University. The students and the instructor will work together to establish optimal conditions for honorable academic work. Questions about academic honesty may be directed to the Office of Student Affairs (http://www.ess.pdx.edu/osa/).

Student Groups and Professional Organizations

Participation in student and professional groups can be a valuable part of your education experience. Membership gives students opportunities to get to know fellow students better, meet and network with professionals, collaborate in solving real engineering problems, learn about internship or job possibilities, socialize and have fun. Your fellow students can be a great source of help and guidance in your academic endeavors. Consider becoming active with a student organization, such as the following:

- American Society of Civil Engineers Student Group (ASCE): http://www.asce.pdx.edu
- Institute of Transportation Engineers Student Chapter (ITE): http://www.its.pdx.edu/ite/

Most professional organizations have monthly meetings and encourage student participation by providing discounts for lunch and dinner meetings. These meetings provide opportunities to network with potential future employers, learn about scholarships, and increasing your technical knowledge. Take a look at these organizations as a starting point:

- American Society of Civil Engineers (ASCE) Oregon Section: www.asceor.org
- Institute of Transportation Engineers (ITE) Oregon Section: www.oregonite.org
- Society of Women Engineers (SWE) Columbia River Section - http://www.swe-columbia-river.org
- Structural Engineers Association of Oregon (SEAO): www.seao.org

Resources

As a PSU student, you have numerous resources at your disposal. Please take advantage of them while you are here. A small sample is listed below:

- CE Website (includes program info, job listings, etc.): http://www.cee.pdx.edu
- CE Website Job Listings: http://www.ce.pdx.edu/ce_jobs.shtml
- Career Center: http://www.career.pdx.edu/
- Academic Advising: http://www.pdx.edu/advising
- Center for Student Health & Counseling: http://www.shac.pdx.edu/
- The Writing Center: http://www.writingcenter.pdx.edu/
- PSU Disability Resource Center: 435 Smith Memorial Union
- Portland CE firms and agencies: http://web.pdx.edu/~bertini/resources.html

Many students have internships, summer jobs, etc., so if you have any questions about how to begin the employment search please let me know.

Note: The PSU Disability Resource Center is available to help students with academic accommodations. If you are a student who has need for test-taking, note-taking or other assistance, please visit the DRC and notify the instructor at the beginning of the term.

Campus Safety

The University considers student safety paramount. The Campus Public Safety Office is open 24 hours a day to assist with personal safety, crime prevention and security escort services. Call 503-725-4407 for more information. For Campus emergencies call 503-725-4404 (from campus phones dial 5-4404). To dial 911 from a campus phone, you must dial 9-911.